REMARKS

Applicant would like to thank Examiner I.B. Patel for promptly corresponding with applicant regarding this matter. In an Interview Summary dated 3/15/2007, Examiner I.B. Patel advised that a complete response to the final rejection would be reviewed by Examiner I.B. Patel who would then decide to reopen prosecution so that Applicant may receive a full and fair examination. Below, any reference made to "the Examiner" is intended to refer to the prior Examiner and not to Examiner I.B. Patel. After reviewing the Remarks below, it will become clear that the claims are in condition for allowance and a notice of allowance should be issued to applicant.

Applicant has amended claim 1 as follows:

The term "adapted" in element f of Claim 1 has been amended to "structured and arranged".

Reconsideration is respectfully requested.

Improper Final Rejection, MPEP 706.07(a)

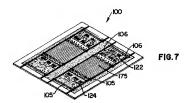
The prior Examiner introduced a new grounds of rejection. The Examiner alleges that our amendments necessitated the new grounds of rejection. Per MPEP 706.07(a), a second or any subsequent action on the merits in any application will not be made final if it includes a rejection, on newly cited art, of any claim not amended by applicant or patent owner in spite of the fact that other claims may have been amended to require newly cited art. Applicant did not amend Claims 13-17. Claims 13 is an independent claim. Applicant respectfully submits that the final rejection is improper and requests that the finality be withdrawn. Applicant also respectfully submits that the claims as amended are in immediate condition for allowance.

35 USC §102

The Examiner has rejected Claims 1-2, 4-17, 40, 42, and 44-45 under 35 USC §102, as allegedly being anticipated by Stopperan (US 5,428,190).

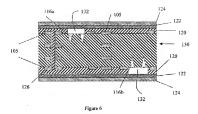
Stopperan discloses a rigid-flex board with anisotropic interconnect and method of manufacture. In Stopperan, the "rigid-flex circuit board" is fabricated by "electrically connecting two rigid boards and one flexible circuit jumper in a superposed relationship". Stopperan, col. 7, lines 48-50 (emphasis added). The structure of the embodiments that Stopperan teaches is one of a flexible jumper connected to two rigid boards such that "when the flexible jumper is bent back so that the rigid boards are positioned to face each other, there is one layer of flexible jumper interposed between them". Stopperan, col. 15, lines. It is noted that Stopperan discloses a post-production process where after the rigid circuit board is made, a flexible jumper is attached to the rigid circuit board.

The prior Examiner relied on Stopperan FIG. 7 (reproduced below) in making the §102 rejection. Stopperan FIG. 7 shows a panel (element 100, also shown as shown in FIG. 4) having at least one rigid circuit board. The panel is scored (element 106) so that the rigid circuit boards (elements 122 and 124) may be snapped out of the single panel. The snapped-out material is then presumably discarded since it has no use.

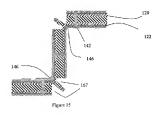


Stopperan discloses that remaining panel material is "routed away". Stopperan, col. 17, lines 28-29. Stopperan also discloses that the panel (element 100) may be aligned with flexible jumpers 175. The rigid portions may be snapped from the panel leaving a structure that has a rigid portion connected by a flexible portion connected to a second rigid portion (see FIG. 8). In such description, the snapped-out portions are still presumably discarded. The geometry of the Stopperan panels and score lines is as follows: Stopperan FIG. 7 discloses a panel "scored to form parallel score lines 106 on each side of the circuits of rigid circuit boards 122 and 124, parallel to a line joining the midpoints of the circuits of the rigid circuit boards 122 and 124. The score lines "extend from one edge of the panel to the opposite edge of the panel so that the panel can be snapped along the score lines neatly". The flexible jumpers are connected to a "corresponding rigid circuit board".

Applicant's invention is clearly completely different from Stopperan. Per applicant's Claim 1, applicant's invention is a rigid-flex circuit board that has a rigid portion (rigid core portion 100, see FIG. 3) and a flexible portion (flexible layer 122) bonded on the top side of the rigid portion and a flexible portion (flexible layer 122) bonded to the bottom side of the rigid portion, as shown, for example, in applicant's FIG. 6 reproduced below.



Applicant's "score lines" are weakened portions, for example, rigid core weakness 116a and 116b, as shown above. The "structurally weakened" rigid core portion will eventually be broken at the structurally weakened point as described below. Again, the flexible layers are bonded to the top and bottom of the rigid core portion. After bonding the flexible layers are bonded to portion (having structural weaknesses), the board is completely rigid. Applicant's specification p. 30, lines 1-2. A series of final structural weaknesses are then made. The rigid core portion is broken by flexing rigid core portion 100. The result will be a flexible connection formed by the flexible layers attached to the rigid core portion. For example, if the flexible connection will be on top, the rigid core portion is broken at the location of rigid core portion is concave in the upward direction) until the rigid core portion is broken at the location of rigid core weakness. After rigid core portion 100 is broken at the location of rigid core portion 100 is either side of such location. Applicant's FIG. 15, reproduced below, shows the system in a "flexed" position.



Applicant's invention as claimed is clearly not disclosed in Stopperan. The score lines in Stopperan are designed to snap out a circuit board from extra panel material. The extra panel material is then presumably discarded. Applicant's invention is a novel way of providing flex in a rigid circuit board by "breaking", not separating into segments, the circuit board at specific locations to make the board flexible.

Claims 1 and 13

Applicant's Claim 1 sets out the following: At least one rigid layer, the rigid layer having a top and bottom side. At least one flexible layer is bonded to the top side of the rigid layer. A second flexible layer is bonded to the bottom side of the rigid layer. The rigid layer comprises at least one first structural weakness (element 116) at at least one first selected location. The first structural weakness is structured and arranged to facilitate breaking said at least one rigid layer to provide at least one first flexible connection formed by said at least one first flexible layer between rigid pieces.

Stoperran does not teach at least one rigid layer; wherein said at least one rigid layer comprises at least one top side, and at least one bottom side; at least one first flexible layer bonded to at least one first portion of said at least one top side; at least one second flexible layer bonded to at least one second portion of said at least one bottom side. The Stopperan reference does not show or teach two flexible layers bonded to a rigid layer as applicant claims. Stopperan does disclose that the rigid board may be connected to two or more flexible jumpers, and vice versa."

However, the example Stoperran gives is to have a flexible jumper attached to a rigid circuit board in a Y configuration. Regardless, Stopperan does not teach applicant's structure as claimed in Claim 1.

Additionally, In addition to the above-mentioned claim, Stopperan does not teach a rigid-flex circuit wherein said at least one rigid layer comprises at least one first structural weakness at at least one first selected location; wherein said at least one first structural weakness is structured and arranged to facilitate breaking said at least one rigid layer at such at least one first selected location into at least two rigid pieces to provide a at least one first flexible connection formed by said at least one first flexible layer between such rigid pieces. In other words, importing language from applicant's specification, a "score line" provides a first structural weakness in the rigid layer so that the rigid layer may be broken into at least two pieces. As the claim is written, the at least one first flexible layer and the at least one second flexible layer are still be bonded to the top and bottom of the rigid layer. In Stopperan, one rigid layer is connected to one portion of a flexible jumper and a second rigid layer is connected to another portion of a flexible jumper. The "score line" in Stopperan does not provide a way to break a rigid layer into two pieces where the two pieces are still connected by a top flexible layer and a bottom flexible layer. In Stopperan, when the score line is broken, one is left with a rigid circuit board attached to a flexible jumper leaving a structure that is not what applicant claims. Applicant claims a first flexible layer bonded to at least one first portion of the top side and a second flexible layer bonded to a second portion of the bottom side. Further, in Stopperan, the broken material is

presumably discarded. In applicant's invention, the breaking provides the ability for the board to flex.

With respect to Claim 13, applicant sets out the following: at least one substantially rigid layer; and at least one substantially flexible layer bonded to at least one portion of said at least one substantially rigid layer; wherein said at least one substantially rigid layer comprises at least one structural weakness at at least one selected location to facilitate bending said at least one rigid layer at such at least one selected location to provide at least one flexible connection.

Again the "score line" of Stopperan does not facilitate bending said at least one rigid layer at such at least one selected location to provide at least one flexible connection. The flexible jumper of Stopperan facilitates bending, not the score line.

Applicant respectfully submits that the Examiner has not established a prima facie case of anticipation under 35 USC §102 with respect to Claims 1 and 13 since the Stopperan reference does not teach each and every element of applicants claims. The courts have ruled that "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Also, "The identical invention must be shown in as complete detail as is contained in the ... claim." Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

In the office action mailed 12/8/06, the Examiner merely recited, verbatim, the elements of applicant's Claim 1, and ambiguously embedded Stopperan element numbers with that recitation. No technical details are given regarding applicant's claims or the Stopperan embodiment. Pointing out some of the errors made by the Examiner, Stopperan assigns element numbers to two rigid circuit boards, rigid circuit board 122 and rigid circuit board 124. The Examiner used those Stopperan numbers to indicate applicant's bottom side rigid layer and top side rigid layer. Stopperan discloses the circuit boards as separate elements. Applicant discloses the top and bottom side being on at least one rigid portion. Further, Stopperan does not disclose that the flexible layer is bonded to the top and bottom of a rigid piece. Further, it appears that the prior Examiner was unsure what applicant's final claimed element was. The Examiner stated "it appears in figure 7 [of Stopperan] that [score line] 106 is capable of breaking into two pieces". As stated above, element 106 is a score line that allows one to snap a rigid circuit board from a panel having many rigid circuit boards. This is NOT applicants claimed invention. See FIG. 15 of applicant's drawings reproduced above. Applicant's structural weakness creates two rigid pieces, however, the two rigid pieces are connected by a flexible layer on the top and bottom of the (now broken) rigid pieces.

As best shown in applicant's Figures 11a and 11b, flexible layers 122 sandwich rigid layer 100. As best shown in Stopperan's Figure 8, rigid layers 70 and 170 sandwich flexible layer 175. By sandwiching a rigid layer with two flexible layers, applicant's invention provides the unique functions of insulating and protecting the rigid layer. Applicant respectfully submits that the Examiner has not established a prima facie case of anticipation under a 5 USC \$102 with respect to Claims 1 and 13 since the Stopperan reference does not teach each and every element of applicants claims. Because the \$102 rejection was improper, it is respectfully submitted that rejection of Claim 1 and 13 (and all Claims dependent thereon) should be withdrawn.

Claim 2

Claim 2 depends from Claim 1. The added limitation of Applicant's Claim 2 is wherein such first structural weakness comprises at least one score that partially penetrates said at least one rigid layer. Per applicant's preamble, we are dealing with a rigid-flex printed circuit board system. The rigid layer of applicant's Claim 1 is thus at least part of a printed circuit board system. The score line in Stopperan does not appear to have function with respect to a printed circuit board system. It is presumably discarded material. Thus, Stopperan does not disclose a score line that partially penetrates at least one rigid layer as applicant claims. Per applicant's claims, a rigid layer is sandwiched between flexible layers. Further, applicant incorporates herein by reference the above arguments relating to Claim 1. It is respectfully submitted that rejection of Claim 2 (and all Claims dependent thereon) should be withdrawn.

Claim 4

Claim 4 depends from Claim 1. The added limitation of Applicant's Claim 1 is "wherein said at least one first structural weakness comprises at least one gap at such at least one first selected location between said at least one rigid layer and said at least one first flexible layer." The Examiner states that Stopperan FIG. 7 discloses at least one gap (between elements 122 and 124, the rigid circuit boards). The examiner notes that the gap was "explained above"; however, there is no explanation of the gap "above".

Regard claim 4: Stopperan discloses in figure 7, at least one gap (gap between 122 and 124) at such at least one first selected location between said at least one rigid layer (explain above) and said at least one first flexible layer (explain above).

Applicant is unsure as to what the Examiner means. There does not appear to be a "gap" between 122 and 124 in Stopperan. There does appear to be a flexible jumper cable connecting two circuit boards, but no "gap" as applicant claims. It appears from this explanation that the Examiner did not understand Stopperan and improperly applied it as a \$102 rejection to Claim 4. Applicant incorporates herein by reference the above arguments. It is respectfully submitted that rejection of Claim 4 (and all Claims dependent thereon) should be withdrawn.

Claim 5

Claim 5 depends from Claim 1. The added limitations of Applicant's Claim 5 are at least one adhesive to bond at least one flexible layer portion of said at least one first flexible layer to at least one rigid layer portion of said at least one rigid layer; wherein said structural weakness comprises selective absence of adhesive at such selected location between said at least one rigid layer and said at least one flexible layer. Again, the Examiner apparently believes that because Stopperan discloses an adhesive that applicant's claim is not novel. Again the Examiner states that the elements are "explained above"; however, there is no explanation above.

Regard claim 5: Stopperan discloses at least one adhesive (see column 9, lines 10-68) to bond at least one flexible layer portion of said at least one first flexible layer (explain above) to at least one rigid layer portion of said at least one rigid layer (explain above); wherein said structural weakness comprises selective absence of adhesive at such selected location between said at least one rigid layer (explain above) and said at least one flexible layer (explain above).

The rejection is clearly improper. The Examiner has not properly considered the structure of applicant's Claim 5. Applicant incorporates herein by reference the above arguments. It is respectfully submitted that rejection of Claim 5 (and all Claims dependent thereon) should be withdrawn.

Claims 6, 7, 16-17

With respect to Claims 6, 7, 16-17, the Examiner is misusing our use of the word "structural weakness". As discussed with respect to the claims above, the Stopperan score line does not apply to our claims. Applicant incorporates herein by reference the above arguments. It is respectfully submitted that rejection of Claim 6, 7, 16-17 (and all Claims dependent thereon) should be withdrawn.

Claims 8, 10, and 11

Applicant's Claims 8, 10, and 11 depend from Claim 1. As explained above with respect to Claims 6, 7, 16-17, the rejection with respect to Claims 8, 10, and 11 is improper. Applicant incorporates herein by reference the above arguments. It is respectfully submitted that rejection of Claim 8, 10, and 11 (and all Claims dependent thereon) should be withdrawn.

Claims 9, 14-15

Applicant's Claim 9 depends from Claim 1. Applicant's Claims 14-15 depend from Claim 13. Again, it is clear that the combinations presented in these claims are not disclosed in Stopperan. Applicant incorporates herein by reference the above arguments. It is respectfully submitted that rejection of Claim 9 and 14-15 (and all Claims dependent thereon) should be withdrawn.

Claim 12

Claim 12 depends from Claim 1. The Examiner refers to Stopperan elements 78, 76, 83, and 82 of FIG. 2. The Examiner's analysis does not take into account our structure as claimed. There is o structural weakness in the Stopperan embodiment cited (FIG. 2). Further, there is no rigid core portion having a flexible layer bonded to the top side of the rigid core and at least one flexible layer bonded to the bottom side of the rigid core. Applicant incorporates herein by reference the above arguments. It is respectfully submitted that rejection of Claim 9 and 14-15 (and all Claims dependent thereon) should be withdrawn.

Claim 40

Applicant's Claim 40 claims the following

- insulating means for electrically insulating conductive portions of the rigid-flex printed circuit board;
- conducting means for conducting electricity through portions of the rigid-flex printed circuit board;
- rigidity means for providing rigidity to all portions of said conducting means;
- d) conversion means for converting portions of rigidity means into a flexible means for flexing portions of said conductor means;
- wherein said conversion means comprises structural weakness means for structurally weakening selected portions of said rigidity means;
- wherein said structural weakness means comprises at least one score that partially penetrates said rigidity means.

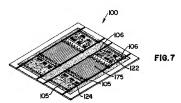
Focusing on the issue, Stopperan does not have a conversion means for converting portions of rigidity means into flexible means. The flexible jumper cable is always flexible and is simply attached to rigid circuit boards. The flexible jumper of Stopperan is never converted from rigidity means into flexible means. Applicant's invention; however, is converted from rigid to flexible. In Stopperan, the rigid portions always remain rigid, and the flexible portions always remain flexible. In applicant's invention, after bonding the flexible layer to the rigid core portion (having structural weaknesses), the board is completely rigid. The rigidity is converted to flexibility when the rigid core portion is broken as described above. Applicant incorporates herein by reference the above arguments. It is respectfully submitted that rejection of Claim 40 (and all Claims dependent thereon) should be withdrawn.

Claim 42

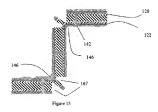
Applicant's Claim 42 claims that said at least one first flexible layer comprises at least one top outermost layer, and said at least one second flexible layer comprises at least one bottom outermost layer. Again the Examiner refers to two rigid separate circuit boards (122 and 124) that have no flexible layers attached to them when they exist as rigid circuit boards. Applicant incorporates herein by reference the above arguments. It is respectfully submitted that rejection of Claim 40 (and all Claims dependent thereon) should be withdrawn.

Claim 44

Applicant's Claim 44 depends from Claim 1 and deals with forming a second breaking point on said at least one rigid layer. The Examiner again relies on FIG. 7. Applicant respectfully submits that this (Stopperan FIG. 7)



is not this (applicant's FIG. 15).

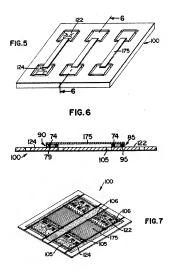


Applicant incorporates herein by reference the above arguments. It is respectfully submitted that rejection of Claim 44 (and all Claims dependent thereon) should be withdrawn.

Claim 45

Applicant's Claim 45 depends from Claim 44. Applicant's claim 45 further limits Claim 44 by adding the following limitation: "said at least one first flexible connection is structured and arranged to provide upwardly concave flexure at said at least one first selected location; and said

at least one second flexible connection is structured and arranged to provide downwardly concave flexure at said at least one second selected location." Again, applicant's flexible connection is provided by breaking a structural weakness in a rigid core portion bonded on the top and bottom by flexible layers. Stopperan discloses attaching a flexible jumper to two rigid circuit boards. Stopperan does not disclose applicant's invention as claimed. Further, Stopperan FIGS. 5-7 (reproduced below) clearly do not show applicant's elaimed structure. There are not at least two selected locations to provide flexure in Stopperan. The only flexible portion in Stopperan is a flexible jumper cable attached to rigid circuit boards after production of the circuit boards. Applicant incorporates herein by reference the above arguments. It is respectfully submitted that rejection of Claim 45 (and all Claims dependent thereon) should be withdrawn.



Applicant believes that all Claims, as amended, are in immediate condition for allowance with respect to 35 USC §102 and respectfully request that all such rejections be withdrawn and that applicant's claims be issued.

35 USC §103

Claims 3, 42, and 46

The Examiner has combined Stopperan with Warner et al. (U.S. 6,665,170) to incorrectly conclude that applicant's invention as claimed is "obvious". The Stopperan reference has been discussed above. Warner et al. discloses a "light emitting diode illumination system". The Examiner rightly admits that the Stopperan reference does not discloses at least one bottom score. The Examiner states that Warner et al. (a light emitting diode illumination system) discloses at least one bottom score (presumably element 22 described by Warner et al. as "V-shaped cross sections allowing the board to be broken into segments by a user to fit a particular application". Warner et al., col. 4, lines 35-38. The purpose of the V-shaped cross sections is to "create variable length illumination segments separable from a common printed circuit board". Warner et al., col. 3, liens 28-30 (emphasis added).

The Examiner states that disclosure in Stopperan plus the disclosure in Warner et al. gives the advantage of breaking the circuit into pieces, or, using the proper language from Warner et al., segments separable from a common printed circuit board. Applicant is not separating segments from a common printed circuit board. It is clear from this §103 rejection that the Examiner did not understand applicant's invention as claimed. Applicant is not breaking a circuit into separate segments. Applicant is creating a series of structural weaknesses to break a rigid layer sandwiched between two flexible layers to create a flexible circuit board. Applicant respectfully submits that "score line" in Warner et al. provides a break point for separating segments into pieces. The score line in Stopperan permits one to presumably remove a rigid circuit board from a panel of extraneous material.

The Federal Circuit has enunciated several guidelines in making a \$103 obviousness determination. A prima facie case of obviousness is established when the teachings from the prior art itself would appear to have suggested the claimed subject matter to a person of ordinary skill in the art. In re Bell, 991 F.2d 781, 783, 26 USPQ2d 1529, 1531 (Fed Cir. 1993) (quoting In re Rinehart, 531 F.2d 1048, 1051 (CCPA 1976)). (Emphasis added). For the Examiner to establish a prima facie case of obviousness, the Examiner must contend that the teachings from the prior art itself or that knowledge generally available to one of ordinary skill in the art would appear to suggest the claimed subject matter to a person of ordinary skill in the art.

Applicant respectfully submits that the Examiner has not used the proper standard for combining references to make obvious rejections. The Examiner has stated "Stopperan and Warner et al. are analogous art because they are from the same field of endeavor to make circuit board. Therefore, it would have been obvious for one of ordinary skill in the art at the time of the invention to make boards of Stopperan to have top/bottom score as taught by Warner" [sic]. The Examiner's logic is apparently that ANY and ALL combinations between circuit board

references are obvious. This is an improper and inappropriate assertion. In order to establish a prima facie obviousness rejection, the Examiner must meet a much higher standard than merely finding two references that are allegedly in the same broadly defined field of endeavor.

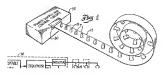
Applicant submits that even if Warner were analogous art (which it is not), it would still not be obvious to one of ordinary skill in the art how to combine the references. Even if one of ordinary skill in the art had the Warner and Stopperan references in front of her, it would not be obvious to her to combine the references as suggested by the examiner to arrive at applicant's invention as claimed. The only way to arrive at applicant's invention given one of ordinary skill in the art and the two cited references would be to inject impermissible hindsight. Thus, it is respectfully submitted that rejection of Claims 3, 43, and 46 (and all Claims dependent thereon) should be withdrawn.

Relevant Art

Applicant briefly addresses the following art cited by the Examiner as "relevant". Applicant respectfully submits that the below cited art is not relevant to applicant's invention as claimed.

Haas (U.S. 5,121,297) discloses a flexible printed circuit where rigid printed circuit sections are merely connected with flexible printed circuit sections. The reference does not teach applicant's invention as claimed.

Hoyt (U.S. 4,173,035) discloses a tape strip for effecting moving light display as shown. The reference does not teach applicant's invention as claimed.



Smith (U.S. 6,762,942) discloses a break away, high speed, folded jumperless electronic assembly. The break away "allows a clean break of the rigid medium along the X-X axis". Presumably, two separate segments result.

Mckenney et al. (U.S. 6,099,745) discloses a rigid/flex printed circuit board and manufacturing method therefore. The reference does not teach applicant's invention as claimed.

Sato (U.S. 4,680,675) discloses a printed circuit board terminal device as shown. The reference does not teach applicant's invention as claimed.



Isaacson (U.S. 3,766,439) discloses an electronic module using flexible circuit board with heat sink means. The reference does not teach applicant's invention as claimed.

Election/Restrictions

The Examiner states that "newly submitted claims 47-50 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: applicant's newly submitted claims are directed toward <u>flexible conductive laver</u> is not originally presented.

Citing MPEP 812.03, the Examiner reasons that since "applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits."

Applicant respectfully submits that Claims 47-50 ARE NOT directed to an independent or distinct invention. Original Claims 12 and 39 claim as elements "a flexible conductive layer".

For the reasons given above, and after careful review of all the cited references, applicant respectfully submits that none of the cited references nor any combination of the cited references will result in Applicant's claimed invention in the present Claims, as amended. But even if any such combination might arguably result in such claimed invention, it is submitted that such combination would be non-obvious and patentable.

A petition and fee for extension of time under 37 C.F.R. § 1.136(a) have been submitted under separate cover. If there are any fees incurred by this Amendment Letter, please deduct them from our Deposit Account NO. 50-1887.

Applicant respectfully requests (not as a matter of form but as a special request in this case) that the Examiner, after having an opportunity to review this Office Action Response, grant a telephonic interview to applicant's undersigned practitioner in order to discuss applicant's response to the Office Action, to attempt to reach mutual understanding and clarify any outstanding issues. Applicant respectfully requests that the Examiner call applicant's undersigned practitioner at 602-263-9200 to schedule a telephonic interview at least two business days in advance to allow the applicant's undersigned practitioner time to prepare and schedule the interview. For telephonic scheduling purposes, applicant's practitioner is located in Arizona, in the Mountain Standard Time zone.

Respectfully submitted,

Date: May 12, 2007

/Michael D. Volk Jr./ Michael D. Volk Jr. (59,338) Stoneman Law Offices 3113 North 3rd Street Phoenix, AZ 85012 Tel: (602) 263-9200 Attorney for Applicant